

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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| CHELMSFORD  |  |
| 19 FEB 2004 |  |
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PCT

To:

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NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

(PCT Rule 71.1)

|                                     |            |
|-------------------------------------|------------|
| Date of mailing<br>(day/month/year) | 16.02.2004 |
|-------------------------------------|------------|

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| Applicant's or agent's file reference<br>P/62303/u18 | <b>IMPORTANT NOTIFICATION</b> |
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|--|--|--|
| International application No.<br>PCT/GB 02/05721 | International filing date (day/month/year)<br>17.12.2002 | Priority date (day/month/year)<br>04.01.2002 |
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| Applicant<br>MARCONI COMMUNICATIONS LIMITED et al |
|---|

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

|  |                    |
|--|--------------------|
| Name and mailing address of the international preliminary examining authority: | Authorized Officer |
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# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

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|---|--|--|
| Applicant's or agent's file reference<br><b>P/62303/u18</b>   | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416) |  |
| International application No.<br><b>PCT/GB 02/05721</b>   | International filing date ( <i>day/month/year</i> )<br><b>17.12.2002</b>   | Priority date ( <i>day/month/year</i> )<br><b>04.01.2002</b> |
| International Patent Classification (IPC) or both national classification and IPC<br><b>H04J14/02</b> |  |  |
| Applicant<br><b>MARCONI COMMUNICATIONS LIMITED et al</b>  |  |  |

  

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

  

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

  

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|---|---|
| Date of submission of the demand<br><br><b>17.07.2003</b>   | Date of completion of this report<br><br><b>16.02.2004</b>                        |
| Name and mailing address of the international preliminary examining authority:<br><br><div style="display: flex; align-items: center;"> <div>             European Patent Office<br/>             D-80298 Munich<br/>             Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br/>             Fax: +49 89 2399 - 4465           </div> </div> | Authorized Officer<br><br><b>Chauvet, C</b><br><br>Telephone No. +49 89 2399-7090 |



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/GB 02/05721**

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-3, 5-7 as originally filed  
4 filed with telefax on 06.02.2004

**Claims, Numbers**

1-8 filed with telefax on 06.02.2004

**Drawings, Sheets**

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/GB 02/05721**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

|                               |             |     |
|-------------------------------|-------------|-----|
| Novelty (N)                   | Yes: Claims | 1-8 |
|                               | No: Claims  |     |
| Inventive step (IS)           | Yes: Claims | 1-8 |
|                               | No: Claims  |     |
| Industrial applicability (IA) | Yes: Claims | 1-8 |
|                               | No: Claims  |     |

2. Citations and explanations

**see separate sheet**

**Re Item V**

**1. Technical field**

The subject-matter defined by independent claims 1 and 5 is directed to the addition of an n-channel DWDM signal to an n-channel DWDM network.

**2. Closest prior art**

Documents D1 (US6288810; Figure 8 and description thereof) and D3 (EP1156607; Fig. 11) disclose an optical network node for an n channel DWDM optical network, the node comprising an add path for adding a n-channel wavelength multiplex onto the network, in which some of the n channels carry signals to be added onto the network, wherein the add path comprises an n-channel signal combiner for combining the n signal channels, an optical amplifier for amplifying the output of the signal combiner, and an add coupler for coupling the add path to the network.

**3. Novelty**

None of the prior art documents cited in the International Search Report shows a multichannel wavelength selective filter with variable per channel attenuation for blocking channels not carrying signals to be added to the network or controlling the amplitude of the added signals.

Instead, the selective reflection circuit 969 in document D1 is used to reflect wavelengths coming from circulator 961 and is transparent to the added signals.

And the tunable filters 226 in document D3 serve as wavelength setting control means and in no way for varying the attenuation of the added signals.

Documents D1 and D3 merely show an amplifier (966 in document D1 and 229 in document D3) for globally, and not per channel, i.e. individually, controlling the amplitude of the added signals.

The subject-matter of claims 1 and 5 is therefore new (Article 33(2) PCT).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/GB02/05721

**4. Problem to be solved and inventive step**

Nothing in the available prior art would lead the person skilled in the art to consider the use of a multichannel wavelength selective filter with variable per channel attenuation for blocking channels not carrying signals to be added to the network or controlling the amplitude of the added signals in order to solve the problem of controlling the signal amplitude of the signals added to the network.

There is apparently no need in the prior art for individually controlling the signal amplitude of the signals added to the network.

Further, no combination of documents D1, D2 (US6285479) and D3 cited in the International Search Report renders the subject-matter of claims 1 and 5 obvious.

The subject-matter of claims 1 and 5 therefore involves an inventive step (Article 33(3) PCT).

**5. Dependent claims**

Claims 2-4 and 6-8 being dependent on one of claims 1 and 5, their subject-matter is new and involves an inventive step (Article 33(2) and (3) PCT).

for combining the  $n$  signal channels, an optical amplifier for amplifying the output of the signal combiner, a multichannel wavelength selective filter with variable per channel loss for blocking channels not carrying signals to be added to the network or controlling the amplitude of the added signals, and an add coupler for coupling the add path to the network.

The invention also provides a method of adding an  $n$ -channel DWDM signal to an  $n$ -channel DWDM network comprising the steps of combining signals from a plurality of signal sources to provide an  $n$ -channel add signal output, amplifying the combined output, using a multichannel wavelength selective filter with variable per channel attenuation to selectively block wavelength channels of the combined signal not carrying signals to be added onto the network or to control the amplitude of the added signal, and coupling the  $n$ -channel add signal onto the optical network.

In an embodiment of the invention, the wavelength selective filter attenuates channels carrying signals to be added to the network to control their amplitude.

Preferably, the selective band pass filter comprises an  $n$ -channel demultiplexer having  $n$  outputs, an  $n$  channel multiplexer having  $n$  inputs and a variable optical attenuator arranged between each of the demultiplexer outputs and multiplexer inputs, wherein the variable attenuator on any given channel is set to block the signal on that channel if no signal on that channel is to be added onto the network.

By demultiplexing the channels of the amplified output of the add signal combiner, a variable optical attenuator can be used on each channel selectively to filter out the

CLAIMS

1. An optical network node for an  $n$  channel DWDM optical network, the node comprising an add path for adding an  $n$ -channel wavelength multiplex onto the network, in which some of the  $n$  channels carry signals to be added onto the network, wherein the add path comprises an  $n$ -channel signal combiner for combining the  $n$  signal channels, an optical amplifier for amplifying the output of the signal combiner, a multichannel wavelength selective filter with variable per channel attenuation for blocking channels not carrying signals to be added to the network or controlling the amplitude of the added signals, and an add coupler for coupling the add path to the network.
2. An optical network node according to claim 1, wherein the multichannel wavelength selective filter comprises an  $n$ -channel demultiplexer having  $n$  outputs, an  $n$  channel multiplexer having  $n$  inputs and a variable optical attenuator arranged between each of the demultiplexer outputs and multiplexer inputs, wherein the variable attenuator on any given channel is set to block the signal on that channel if no signal on that channel is to be added onto the network, or used to control the amplitude of the added signals.
3. An optical network node according to any of claims 1 to 2, comprising means for running sources for generating the  $n$ -channel signals at maximum power.
4. A DWDM optical communications network having a plurality of nodes according to any of claims 1 to 3.



5. A method of adding an n-channel DWDM signal to an n-channel DWDM network, comprising the steps of combining signals from a plurality of signal sources to provide an n-channel add signal output, amplifying the combined output, using a multichannel wavelength selective filter with variable per channel attenuation to selectively block wavelength channels of the combined signal not carrying signals to be added onto the network or to control the amplitude of the added signals, and coupling the n-channel add signal onto the optical network.
6. A method according to claim 5, comprising running the signal sources at full power to optimise the optical signal to noise ratio of the signal added to the network.
7. A method according to any of claims 5 or 6, comprising demultiplexing the combined amplified add signal using an n-channel demultiplexer, passing each of the output channels of the demultiplexer through a variable optical attenuator (VOA) and multiplexing the VOA outputs to form the network add signal.
8. A method according to claim 7, wherein the non-signal carrying channels are blocked by attenuating to zero the outputs from the demultiplexer corresponding to those channels